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LD/2004/01542

Certificate

REPUBLIC OF SOUTH AFRICA

PATENT OFFICE
DEPARTMENT OF TRADE AND
INDUSTRY

Hiermee word gesertifiseer dat
This is to certify that

the documents attached hereto are true copies of Forms P1, P2
and provisional specification and drawing of South African Patent Application
No. 2003/3726 in the name of Burchell Shaun

Filed : 14 May 2003
Entitled : Embedded-Type
Reflective Road
Marker

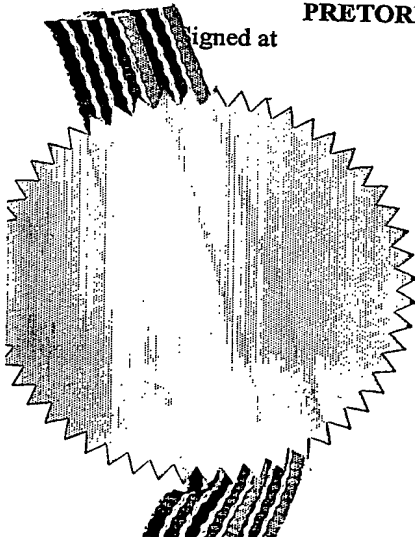
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COMPLIANCE WITH RULE 17.1(a) OR (b)

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in die Republiek van Suid-Afrika, hierdie
in the Republic of South Africa, this

19th dag van
May 2004
day of

Registrar of Patents



REPUBLIC OF SOUTH AFRICA		REGISTER OF PATENTS		PATENTS ACT, 1978	
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FULL NAME(S) OF APPLICANT(S)/PATENTEE(S)					
71	BURCHELL, SHAUN				
APPLICANTS SUBSTITUTED:				DATE REGISTERED	
71					
ASSIGNEE(S)					
71					DATE REGISTERED
FULL NAME(S) OF INVENTOR(S)					
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PRIORITY CLAIMED		COUNTRY	NUMBER	DATE	
N.B. Use International abbreviation for country (see Schedule 4)		33	NIL	31	NIL
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TITLE OF INVENTION					
54	EMBEDDED-TYPE REFLECTIVE ROAD MARKER				
ADDRESS OF APPLICANT(S)/PATENTEE(S)					
30 ITOGEN ROAD, SELCOURT, 1559, GAUTENG, SOUTH AFRICA					
ADDRESS FOR SERVICE				S & F REF	
74	SPOOR & FISHER, SANDTON			PA135090/P	
PATENT OF ADDITION NO.			DATE OF ANY CHANGE		
61					
FRESH APPLICATION BASED ON			DATE OF ANY CHANGE		

SPOOR & FISHER

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
APPLICATION FOR A PATENT
AND ACKNOWLEDGEMENT OF RECEIPT 13.05.03
(Section 30 (1) - Regulation 22)

REPUBLIC OF SOUTH AFRICA
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The granting of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

OFFICIAL APPLICATION NO.

21 01 **42003/3726**

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INROASTE
REPUBLIC VAN SUID AFRIKA
S & P REFERENCE

PA135090/P

FULL NAME(S) OF APPLICANT(S)

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TITLE OF INVENTION

54 EMBEDDED-TYPE REFLECTIVE ROAD MARKER

THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. THE EARLIEST PRIORITY CLAIM IS:

COUNTRY: NIL

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DATE: NIL

THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.

21 01

THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND IS BASED ON APPLICATION NO.

21 01

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1. A single copy of a provisional specification of 9 pages.
- ☒ 2. Drawings of 3 sheets.
- ☐ 3. Publication particulars and abstract (Form P.8 in duplicate).
- ☐ 4. A copy of Figure of the drawings (if any) for the abstract.
- ☐ 5. Assignment of invention.
- ☐ 6. Certified priority document.
- ☐ 7. Translation of the priority document.
- ☐ 8. Assignment of priority rights.
- ☐ 9. A copy of the Form P.2 and the specification of S.A. Patent Application No.
- ☐ 10. Declaration and power of attorney on Form P.3.
- ☐ 11. Request for ante-dating on Form P.4.
- ☐ 12. Request for classification on Form P.9.
- ☒ 13. Form P.2 in duplicate.
- ☐ 14. Other.

74 ADDRESS FOR SERVICE: SPOOR & FISHER, SANDTON

Dated: 14 May 2003

[Signature]
SPOOR & FISHER
PATENT ATTORNEYS FOR THE APPLICANT(S)

RECEIVED
REGISTRAR OF PATENTS DESIGNS, TRADE MARKS AND COPYRIGHT
2003-05-14
REGISTRAR OF PATENTS REGISTRAR VAN PATENTE HANDELSMERKE EN OUTEURE

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

PROVISIONAL SPECIFICATION

(Section 30(1) – Regulation 27)

OFFICIAL APPLICATION NO.

21	01	2003/3726
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22	14 MAY 2003
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FULL NAMES OF APPLICANTS

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FULL NAMES OF INVENTORS

72	BURCHELL, SHAUN
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TITLE OF INVENTION

54	EMBEDDED-TYPE REFLECTIVE ROAD MARKER
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"EMBEDDED-TYPE REFLECTIVE ROAD MARKER"

BACKGROUND TO THE INVENTION

THIS invention relates to an embedded-type reflective road marker.

In general there are two distinct types of reflective road marker, both of which are used to mark relevant features on a road surface, typically the centre line and shoulder lines. Surface mounted reflective road markers have a generally flat base which can be fixed to the road surface, normally by means of a suitable adhesive. Such road markers, which are generally cheaper to manufacture and install, are frequently dislodged from the road surface as a result of impacts from the tyres of passing vehicle. Embedded-type road markers are partially embedded in the road surface and are accordingly less susceptible to dislodgement. The present invention is particularly concerned with this latter type of road marker.

A currently popular embedded-type road marker, manufactured and supplied by Pilkington Glass and/or Holophane under the name Armourstud™, has an upper shell of moulded glass. In combination with a base structure, the shell forms a hollow chamber in which a separately manufactured support structure is mounted. In use, a lower part of the shell and the base structure are recessed and fixed in a hole cut for the purpose in the road surface, thereby anchoring the marker. The support structure carries one or more reflectors. In operation at least a portion of the light cast onto the marker by the headlights of an approaching vehicle is reflected back to the eyes of the driver of the vehicle, the light passing through the glass shell both on entry into and exit from the marker.

The glass shell is expensive and difficult to manufacture. With the base, necessary sealing components to seal the shell to the base and internal support and reflector components, the marker is of multi-part construction and requires time and expertise to assemble properly. Another problem with the known markers of this type results from the desirability of providing for different light colours for markers designating different road features. For instance, normal practice is that a centre line marker should reflect white or red light depending on whether the centre line is a broken line implying that overtaking is permissible or is solid implying that overtaking is prohibited, and that a shoulder lane marker should reflect yellow or amber light. In practice attempts to incorporate appropriate pigments in the glass shell of the known markers, so that the reflected light is has the correct colour, have been unsuccessful. This is primarily because there is no readily available pigment which is compatible with the glass moulding process and which will be resistant to ultraviolet light to which the marker will be subjected in use. Mere use of differently coloured reflectors internally in the marker have also proved to be unsuccessful.

SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided an embedded-type reflective road marker comprising a generally convex shell and a base mateable with a lower edge of the shell to define, in combination with the shell, an internal chamber, the shell being moulded in one piece of a light-transmitting plastics material and incorporating at least one integrally moulded reflector to reflect light cast onto the marker in use.

The reflector may, for instance be configured as a corner cube prism reflector.

The shell will typically incorporate two reflectors facing in generally opposite directions.

According to another aspect of the invention there is provided an embedded-type reflective road marker comprising a generally convex shell and a base mateable with a lower edge of the shell to define, in combination with the shell, an internal chamber, the shell being moulded in one piece of a light-transmitting plastics material and the lower edge of the shell including a plurality of circumferentially spaced, externally projecting ribs to fix the marker against rotation when embedded in a road surface in use.

The shell preferably has a raised, central rib and a pair of oppositely inclined, externally planar surfaces extending downwardly from the central rib in a direction towards the lower edge, such that the shell has approximately an external gable shape in a cross-section transverse to the rib. The reflector(s) is/are preferably moulded integrally with portions of the shell forming the said planar surfaces.

The shell may be injection moulded in one piece using a single shot injection mould, in which case it may be of the same colour, or clear or translucent, throughout. Alternatively, the shell may be moulded in one piece such that different portions thereof are of different colours. In the latter case, the shell may be moulded in one piece using a two-shot mould such that opposite sides thereof, separated from one another by a central plane parallel to the central rib, are of different colours.

According to yet another aspect of the invention there is provided an embedded-type reflective road marker comprising a generally convex shell moulded in one piece of a light-transmitting plastics material and a base mateable with a lower edge of the shell to define, in combination with the shell, an internal chamber, the chamber accommodating at least one reflector which is mounted to a wall of the shell and which is arranged to reflect light through that wall.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

- Figure 1 shows an exploded perspective view of a road marker according to this invention;
- Figure 2 shows a side view of the assembled marker;
- Figure 3 shows a side view of the assembled marker in the direction of the arrow 3 in Figure 2;
- Figure 4 shows a plan view on the marker;
- Figure 5 shows a cross-section at the line 5-5 in Figure 4;
- Figure 6 shows a cross-section at the line 6-6 in Figure 4;
- Figure 7 shows an underplan view of the shell of the marker; and
- Figure 8 shows a plan view on the base of the marker.

DESCRIPTION OF A PREFERRED EMBODIMENT

Figure 1 illustrates a road marker 10 according to this invention in an exploded perspective view. The marker 10 has two components, namely a generally convex shell 12 and a disc-shaped base 14. The shell 12 is injection moulded in one piece of a suitably hard and tough plastics material. A preferred material is an acrylic, possibly that marketed under the name OROGLASS® by Atofina of Italy. The base 14 is injection moulded in one piece, typically of a polycarbonate, but it may alternatively be of the same plastics material as the shell 12.

With reference to Figures 1 to 7, the shell is of generally circular shape in plan and has a raised, central rib 16 extending diametrically. The rib terminates laterally at vertical shoulders 18 and longitudinally it merges into end structures 20 that extending circularly. Externally planar walls 22 extend, at opposite inclinations, downwardly from the lower edges of the shoulders 18 to horizontal walls 24. The walls 24 extending outwardly to meet, at shoulders 26, the upper edge of a generally conical wall portion 28. The latter wall portion merges with a round cylindrical side wall portion 30 that extends downwardly to a peripheral, laterally projecting flange 32 of circular shape.

The circularly extending end structures 20 also merge downwardly, at diametrically opposed positions, into the conical wall portion 28. The structures 20 define upstanding ridges that extend circularly along the side edges of the walls 22.

External, circumferentially spaced, gusset-like projections or ribs 34 extend integrally, in radial directions, between the cylindrical wall portion 30 and the flange 32.

Extending transversely across the underside of the central rib 16 is a further series of internal, spaced apart projections or ribs 35 which serve to reinforce the rib.

Internally, the lower edge of the cylindrical wall portion 30 has a stepped profile as will be particularly apparent from Figures 5 and 6.

The internal surfaces of the walls 22 are formed, during the moulding process, to have non-planar surfaces shaped to act as reflectors 36. In this embodiment, the internal surfaces are moulded as corner cube prism reflectors. Reflectors of this kind will be well known to persons skilled in the art of optical reflectors.

Overall, the shell 12 has a robust, generally convex shape as mentioned above. When viewed in a central cross-section transverse to the rib 16, the shell has externally an approximately gable shape, defined largely by the rib 16 and the walls 22, as will be particularly apparent from Figure 6.

The base 14 has a circular shape. Its bottom surface 40 is flat while its upper surface 42 is formed with an array of mutually orthogonal, upstanding ribs 44 forming a multiplicity of square recesses therebetween. The periphery of the base is formed with a stepped profile matching the internal profile at the lower edge of the side wall portion 30 of the shell 12.

The marker 10 is assembled by fitting the base 14 into the lower edge of the shell 12 and fixing it there by ultrasonic welding to form a sealed internal chamber 50. The assembled marker is then located in a hole 52 cut in a road surface 54 (Figure 6) and is anchored there by an appropriate adhesive 56 which partially embeds the marker in the road surface.

The marker is oriented such that the rib 16 is transverse to the direction in which vehicles travel on the road, i.e. transverse to the line which is being marked. The embedded, projecting ribs 34 prevent the marker from rotating out of this orientation. At the same time, the inclination of the outer surfaces of the ribs also prevents the marker from being pulled upwardly out of the road surface.

On a road where vehicles are travelling simultaneously in opposite directions, separate from one another by a centre line on which markers 10 have been installed, the walls 22 face in opposite directions towards the oncoming traffic. Light cast by the headlights of a vehicle will pass through the relevant wall 22 and will be reflected back through that wall, by the associated reflector 36, such that a portion of the reflected light will travel to the eyes of the driver of the vehicle. The position of the centre line will accordingly be readily apparent to the driver.

It will be understood that the reflectors 36 are designed to reflect light, cast on the marker over the applicable range of angles, back through an appropriate range of angles, such that a meaningful amount of light reaches the driver's eyes.

Assuming that the plastics material of which the shell is moulded is consistent throughout, it will also be understood that the refractive index of such material, the thickness of the walls 22, the specific design of the reflector and so on will all be carefully chosen to ensure adequate light reflection through an appropriate range of angles.

In cases where the marker is installed in a road surface where it is only necessary to reflect light in one direction, as opposed to opposite directions, a reflector may be provided for one of the walls 22 only. This could, for instance, be the case for a marker used to indicate a line marking the shoulder or run-off lane of a road.

For white light reflection, the shell 12 may be moulded in a colourless, typically clear material. However where the marker 10 is to be positioned to reflect another light colour, such as red or yellow, it is possible to incorporate an appropriate pigmentation or colouration in the plastic material during moulding. Where a single shot injection mould is used, this will result in a shell 12 which is consistently of the chosen colour.

In some cases, it is desirable for a single marker to reflect different light colours in opposite directions. This may for instance be the case where the marker is installed on a centre line and is required to reflect red light in one direction to indicate to drivers approaching from that direction that overtaking is prohibited, and white light in the opposite direction to indicate to drivers approaching from that direction that overtaking is permitted. To achieve this it is possible to mould the shell 12 in one piece using a two-shot mould in which the plastics material is introduced simultaneously from opposite sides of the central rib 16.

The plastics material introduced from the opposite sides may then have different pigmentation or colouration, resulting in a shell 12 which has different colours on opposite sides of a central vertical plane, indicated by the numeral 60 in Figure 2.

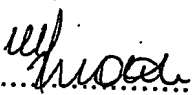
The marker 10 has a number of advantages compared to the previously described Armourstud™ marker of the prior art. These advantages include the fact that the marker has only two components, namely the shell and the base, whereas the Armourstud™ marker has multiple components. Injection moulding of the plastics components and subsequent assembly thereof to form the complete marker will, it is believed, be simple and economical.

Another advantage arises from the fact that it is possible to provide reliable colouration of the marker for different applications. Still further, as described above, the shell can be moulded in two colours, enabling the marker to reflect light of different colour in opposite directions.

Another important advantage of the illustrated embodiment is the fact that a substantial free volume remains in the marker after assembly. This provides space to accommodate additional safety equipment in the marker. Such equipment may, for instance, include light sources, such as LEDs (light emitting diodes), solar panels to produce energy to power the light sources, sensors for detecting wet conditions, black ice conditions or conditions of darkness and so on. Such equipment could, for instance, be the same as or similar to road marker equipment supplied by Astucia Traffic Management Systems of the United Kingdom in its SolarLite range of products. With such added features, the marker 10 can enhance the safety of road users. The incorporation of such features is not possible with the Armourstud™ marker in view of the considerable space taken up by the reflector support structure which is centrally located in the chamber.

As indicated previously, it is possible in other embodiments of the invention, not illustrated, for the reflector 36 to be a separately moulded item which is then fixed in position, internally against the wall 22, before the base is connected to the shell. Although this proposal will add an additional assembly step in the manufacture of the marker 10, it has the advantage that plastics material of different refractive index or quality can be used for the shell and for the reflector respectively. It also makes it possible to use clear or colourless plastic for the shell and to incorporate reflectors of different colour.

Dated this 14th Day of May 2003


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SPOOR & FISHER

Applicant's Patent Attorneys

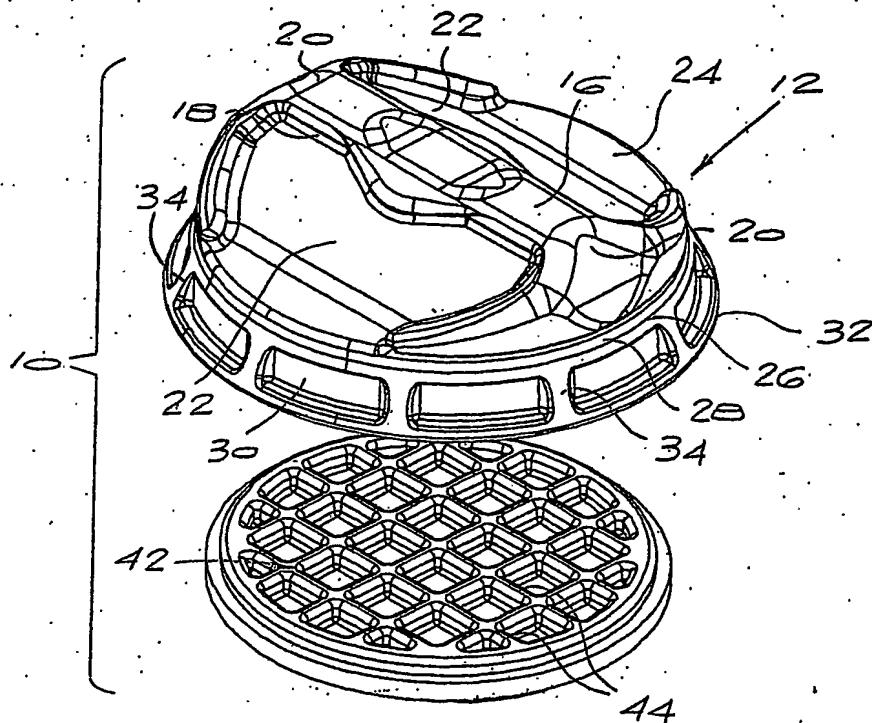


Fig.1

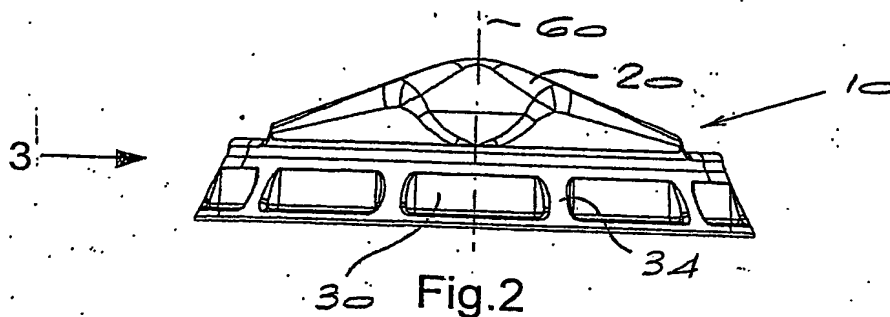


Fig.2

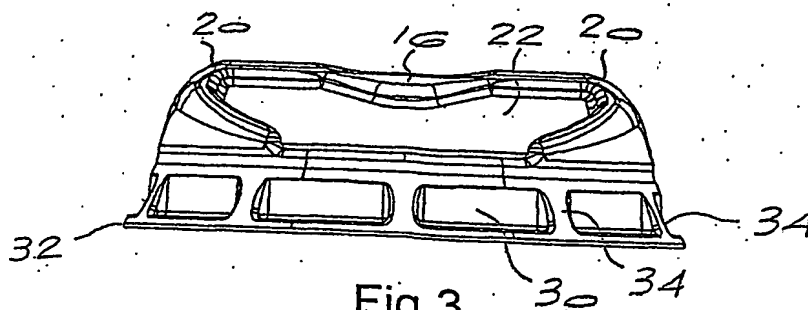


Fig.3

Self
Woods

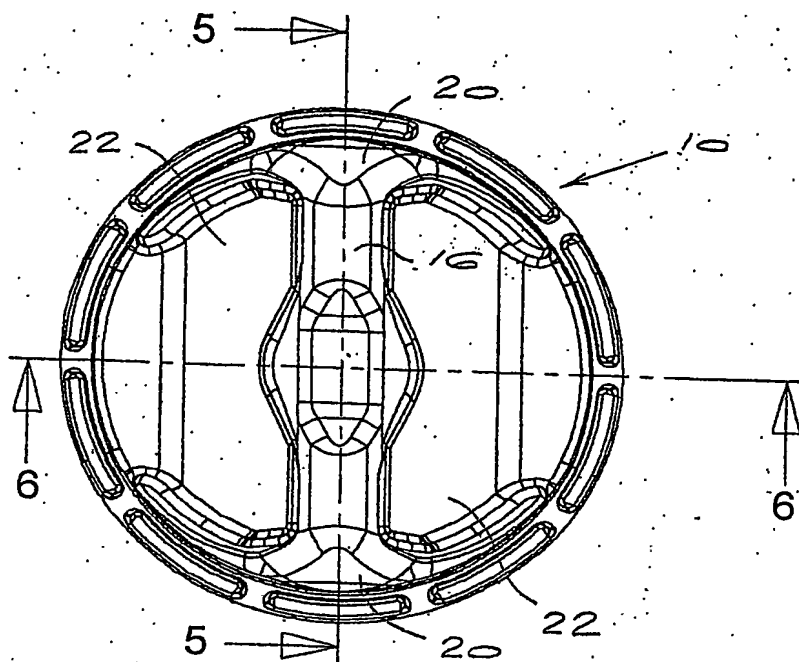


Fig. 4

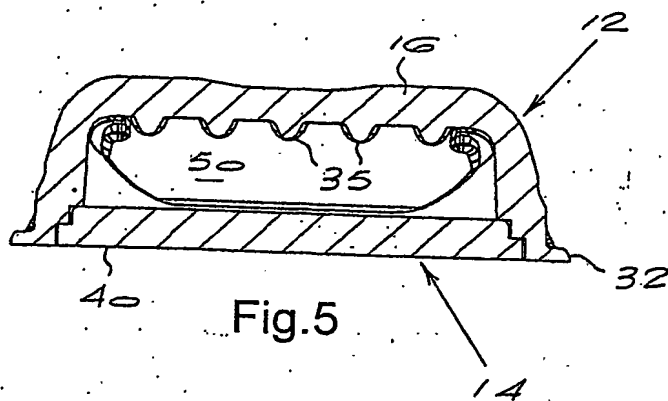


Fig. 5

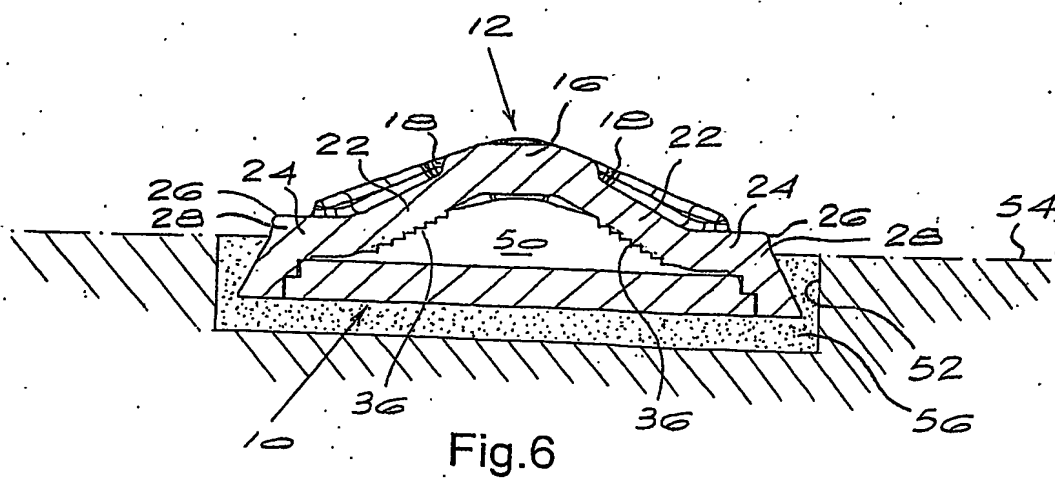


Fig. 6

W. Moon

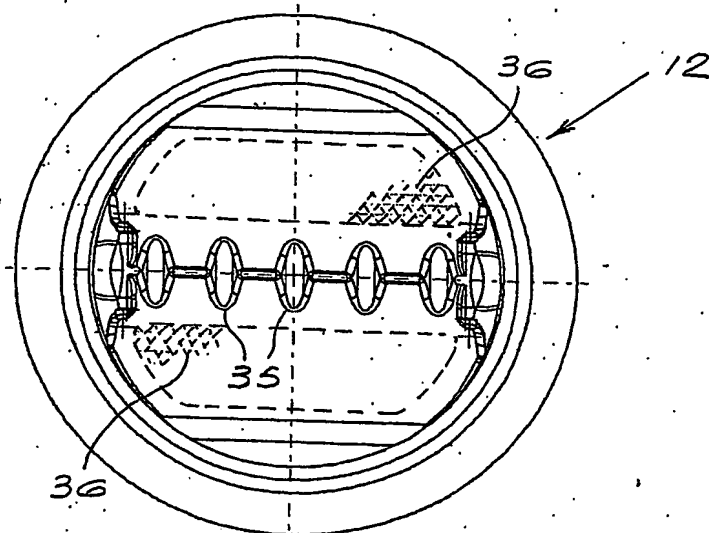


Fig. 7

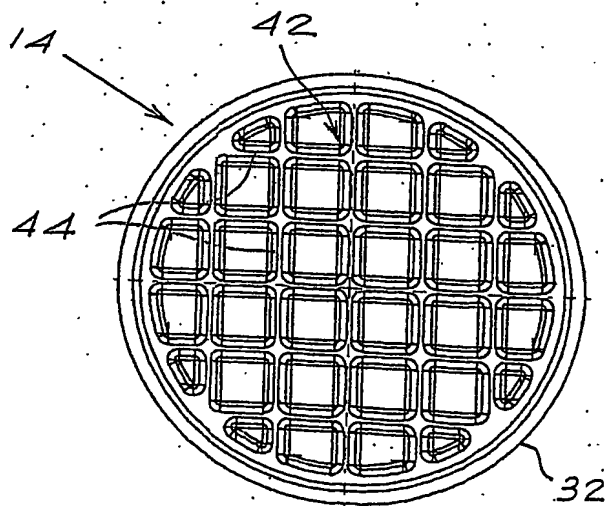


Fig. 8

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